of the research on the absorption of radiation by water vapour. To him is due a spectrobolometric method of determining (within 1 or 2 per cent.) the total quantity of water vapour between the observer and the sun. This method should supersede the approximations based on psychrometric observations at different levels.

This observatory undertakes the fitting up, standardisation, and packing of the copies of the silver disc pyrheliometers supplied at cost price by the Smithsonian Institution. During the past year ten of these instruments were sent out, chiefly to Governmental meteorological stations.

The Spectroscopic Binary BD -1° 943.—The star δ Orionis was found by Hartmann in 1904, to be a spectroscopic binary, but the K-line did not take part in the regular displacements of the other lines. The hypothesis he has put forward to explain this apparent anomaly is that the K-line was due to the absorption of a calcium cloud which lay between stars of this class and the solar system. In the *Astronomische Nachrichten,* No. 4633, Zaccheus Daniel informs us that a star the position of which is 5h. 28·9m. -1° 13′, and was announced by Adams to be a spectroscopic binary, has a similar peculiarity to the one mentioned above. Its Harvard magnitude is 5·37, and its spectrum B2. Measurements of five, on the thirteen spectrograms secured at the Alleghany Observatory, of the best hydrogen and helium lines indicate a range in velocity of more than 200 km., a period of 3·05 days satisfying these velocities. Measurements of the K-line on eleven plates give velocities ranging from +5 to +25 km., the mean being +17 km. This value is nearly the same as that deduced by Hartmann from his measures of δ Orionis, which star is less than a degree from the binary under the above heading.

Variable Star Charts.—In the *Annales* of the Astronomical Observatory of Moscow, published under the direction of Prof. W. Ceraski (supplement to vol v., second series), Prof. Ceraski publishes a third series of thirty photographic charts of variable stars discovered by Madame L. Ceraski on the clichés of the observatory. The size of each chart represents eighty minutes of arc, and the charts are oriented after the Bonner Durchmusterung. The position of the variable is the centre of the plate, and is indicated by a small cross. Twelve of the variables represented are of the Algol type. The charts serve the very useful purpose of identification of the variables recorded, and are well reproduced.

EDUCATIONAL ORGANISATION IN AUSTRALIA.

TWO events which are certain to have great influence in the future development of education in Australia have recently taken place in New South Wales. One concerns the secondary schools of New South Wales, the other the University of Sydney. But in both cases their effects are sure to extend beyond the boundaries of the State to which they apply.

The first is that the Department of Public Instruction has introduced into New South Wales the system of intermediate and leaving certificates, as begun and carried out with success by the Scotch Education Department. An examination for the intermediate certificate has just taken place. Between 1500 and 2000 candidates presented themselves; but on this occasion the examination was only open to pupils of the State schools. At the close of next year the first complete leaving certificate examination will be held, and probably about 1000 candidates will come forward. That examination, and those in later years, will be open not only to the pupils of the State schools, but also to those of private secondary schools which have submitted to inspection, and have been placed upon the register as providing a satisfactory four-years' course of secondary education. A further increase in the number of State high schools is promised, both in the country towns and the city, and the number of candidates for the final examination is expected to grow rapidly in the next few years.

Written examinations enter only as part of the scheme. The candidates present themselves for the intermediate examination when they have completed an approved two-years' course in a secondary school; they come up for the leaving certificate examination when they have reached the end of an approved four-years' course.

In several minor matters the New South Wales system differs from that upon which it has been modelled, but to these one need not refer. One point, however, must be mentioned; to some it may seem an unnecessary alteration, to others a serious defect. The certificate of the Department of Public Instruction of New South Wales is to be granted on the recommendation of a board of examiners, appointed by the Governor. This board is to consist of four officers of the Department, and not fewer than four professors or other teachers of the University, nominated by the Senate of the University. In other words, the University of Sydney is associated with the Department of Public Instruction in the conduct of the examination.

To explain all the reasons for this association would take too long; nor is it necessary. It is chiefly due to the fact that until recent years the Departments of Public Instruction in the Australian States concerned themselves chiefly with primary education. For the most part secondary education was left to the private schools; or, as in Queensland, to grammar schools receiving a Government subsidy. In these circumstances the universities had organised a system of public examinations, somewhat after the pattern of the Oxford and Cambridge Locals. These public examinations had gained the confidence of the people and set a high standard of attainment. Of course, they had, and still have, some of the vices of all written examinations which are completely divorced from the school work and independent of inspection. But by accepting the cooperation of the University in the examination for the leaving certificate, the Department hopes not only to benefit by the service of skilled and independent examiners, but to graft upon the new system all that is best in the old.

The second event mentioned in the opening sentence is the more important, though it is not unconnected with the first. After prolonged debate, an Act entitled "The University (Amendment) Act, 1912," has been passed. In this Act provision is made for certain changes in the constitution of the governing body of the University of Sydney, and its endowment is materially increased. But these two objects were not the main reason for the introduction of the measure, nor was it either of these which principally attracted public attention. The vital principle of the Bill was that a large number of exhibitions were to be founded, entitling the holders to exemption from fees at the University, so long as they made satisfactory progress with their studies. A fixed number of these public exhibitions is to be allotted each year, the number having a definite ratio to the population. One exhibition is to be given for every 500 persons in the State between the ages of seventeen and twenty,

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as shown by the last preceding census. With the present population this works out at 200 per annum. If we take the length of the average course as four years, when the scheme is in full working order there should be 800 students at the University each year, for whom the State would pay.

At first it was intended that the exhibitions should be awarded only to holders of the leaving certificate. However, it was pointed out that in this way a deserving class would be deprived of the benefits of the measure. No exhibition could have been given to the man who desired to enter the University several years after he had left school; nor could one be gained by the lad who had been educated privately, or at a school below the standard required for registration. To remedy this defect, it was provided that, while the exhibitions were to be given each year on the results of the written examination for the leaving certificate, any person other than a candidate for the certificate, who had been a resident in New South Wales for three years, might compete at such examinations, and should be considered equally with the holders of the leaving certificate in the allotment of the exhibitions, except that the number given in any year to these persons should not exceed 5 per cent. of the total for that year.

For this measure the Labour Government of New South Wales is responsible. One of the planks in the policy of that party is free education from the school to the University; and one of the principles for which the party contends is equality of opportunity for the ablest pupils in the schools to advance further with their studies when they have proved their ability and industry. Free university education has not been pressed, but equal opportunity has been demanded, and this measure is meant to provide that opportunity.

The primary and secondary schools of New South Wales are already free; but to make the secondary schools free, and to provide also a large number of exhibitions exempting from fees at the University, is not sufficient to remove the obstacle in the way of an able boy or girl whose parents have only the most moderate means. For such cases additional assistance is required, and for them suitable provision has been made. Bursaries are to be granted to the best pupils of the elementary schools, assisting them, when they stand in need of such assistance, in their passage through the secondary school. On the successful completion of the secondary-school course, University bursaries are given by the State with a similar end in view.

The measure has been criticised in various quarters. Representatives of the professional classes spoke of the cheapening of the professions and of the lowering of the standard. But it was an easy task to answer these objections. The exhibitions are to be granted on the results of an examination in the regulations for which it is expressly provided that the subjects and standards shall be such as the University determines are necessary for matriculation. Also the University shares in the conduct of, and the responsibility for, the examination. The difference which this measure has made is that in New South Wales the boy whose parents cannot afford the fairly large expense of university education will not be cut off from the chance of gaining its benefits, if he proves himself to possess distinct ability and application.

The only serious vital criticism of the measure was that which pointed out that the increase of 10,000*l.* in the endowment of the University would not cover the ultimate loss it would suffer from the non-payment of fees and enable it to meet the other charges imposed upon it by the Bill. The University has, however, no real cause to be anxious on this account; it possesses the confidence of the people, and it is receiving each year largely increased sums of money on the Estimates. So far as this measure is concerned, Mr. Carmichael, the Minister for Education, to whom it is due, stated the situation in the Legislative Assembly as follows:—

"I have given my word on behalf of the Government that before 1916, when the University will receive the full flow of graduates, we shall increase the statutory endowment to meet the demands. I propose, if the Government has an opportunity—and, if not, I hope our successors will recognise the obligation—to raise the endowment in 1915 by another 10,000*l.* From the present day on to 1915 the University is to the good on this deal. I think we may fairly claim to have shown a liberality to the University which I hope our successors in office—if we do not remain here—will follow up. After 1915 the endowment will be increased to meet the requirements of the future."

It is now two years since the change of Government in New South Wales which for the first time gave the power into the hands of the Labour Party. These two years have been marked by great advances in the cause of education from the lowest to the highest level. To those who watch the evolution of democratic government in Australia it may be an interesting fact that, where the democratic tendency is most marked, the claims and advantages of the highest education have their strongest advocates and fullest recognition. New South Wales and Victoria have the advantage over the other Australian States which accompanies larger resources, a greater population, and further development. They have been able more thoroughly to undertake the work of school and university education, and so far as this State is concerned, it may be claimed that the leaders of the democracy, to whatever party they belong, have already abandoned the idea that the highest work can be done without the highest educational preparation for it.

H. S. CARSLAW.

RECENT WORK ON INVERTEBRATES.

THE *Entomologists' Monthly Magazine* for December, 1912, contains two beautifully coloured plates of Lepidoptera, illustrating new and rare species described by Messrs. Hamilton and Herbert Druce and Dr. T. A. Chapman.

In concluding, in the same issue, their notes on the British representatives of the leaping beetles of the genus Longitarsus, Messrs. Tomlin and Sharp direct attention to the apparently instable state of evolution of these beetles, some individuals of a species being winged, while others are apterous. This condition seems to point to the progressive disappearance of the wings in the group; and it is suggested that this may be due to the development of the saltatorial powers. Why it should be more advantageous to jump than to fly is not, however, very apparent, although it may be that the former mode of progression facilitates escape from enemies. A similar suggestion, it may be remembered, has been made in the case of the jumping Australian mice and rats, as compared with ordinary mice and rats, the leaping movement not improbably tending to baffle birds of prey.

In the second part of *Verh. Naturhist. Vereins der preuss. Rheinlande u. Westfalens for* 1911 (1912), Dr. C. Röttgen completes his long account of the beetles of Rheinland. In the same issue Dr. F. Haas

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